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FLAWS IN RESEARCH DESIGN.
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SOME COMMON FLAWS IN EDUCATIONAL RESEARCH DESIGN WERE ANALYZED ON THE BASIS OF A STUDY BY DR. GERALD SMITH OF 1,091 UNSUCCESSFUL RESEARCH PROPOSALS. THE FOLLOWING INADEQUACIES ARE DISCUSSED-- (1) THE LACK OF SPECIFICITY IN EVERY ASPECT OF THE RESEARCH DESIGN, (2) THE NON-DELIMITED PROBLEM, (3) THE LACK OF THEORETICAL FRAMEWORK FROM WHICH TO APPROACH THE PROBLEM, (4) THE LACK OF SIGNIFICANCE (USUALLY OVER-SIMPLIFICATION OF A COMPLEX PROBLEM), (5) THE FAILURE TO EXAMINE THOROUGHLY AND CRITICALLY PREVIOUS RESEARCH IN THE AREA, (6) THE PROVINCIALISM IN THE REVIEW OF RESEARCH (LIMITED SCOPE, GEOGRAPHY, SUBSTANCE, AND METHOD), (7) THE FAILURE TO INCLUDE REVIEW OF RELATED RESEARCH IN THE PROPOSAL, (8) THE FAILURE TO INCLUDE OBJECTIVES, HYPOTHESES, AND QUESTIONS OR INCLUSION OF BROAD OR VAGUE STATEMENTS OF OBJECTIVES, (9) INADEQUACIES IN SAMPLING (INCOMPLETENESS, LACK OF CLARITY IN SAMPLING PLAN, LACK OF WELL-DEFINED POPULATION), (10) THE FAILURE TO DESCRIBE TECHNIQUES AND INSTRUMENTS TO BE USED IN THE RESEARCH, (11) INCOMPLETE DESCRIPTION OF THE STATISTICAL TREATMENT OF THE DATA, (12) THE USE OF UNSCIENTIFIC LANGUAGE OR OVERUSE OF TECHNICAL OR PSEUDO-TECHNICAL LANGUAGE, AND (13) NO CONTROL FOR THE HAWTHORNE EFFECT. TEN CONCLUSIONS DRAWN FROM THE ANALYSIS OF RESEARCH-DESIGN INADEQUACIES CONCERNING THE AREA OF EDUCATIONAL RESEARCH ARE LISTED. THIS PAPER WAS PRESENTED TO THE NATIONAL READING CONFERENCE (SAINT PETERSBURG, DECEMBER 2, 1966). (LS)

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FLAWS IN RESEARCH DESIGN

Research to the scientist is a careful and systematic inquiry, usually requiring considerable time and using the best developed techniques. Research starts with a purpose, an intent to solve a clearly conceived problem. If the problem is to be solved, it is essential that the most appropriate research design be used. However, once a particular design is selected, it may contain flaws.

The most serious flaw in a research design is lack of specificity. If specificity is not evident in every aspect of a research design, the whole proposal is suspect because the reader cannot be sure what the investigator intends to do. In fact, there is room for considerable doubt that the investigator really knows what he intends to do. The reader must be sure what the problem is, what the hypotheses state, and what statistical design the investigator plans to use. Both the reader and the investigator must know what is meant. The reader can be guided only by what is stated.

During the several years I spent with the Bureau of Research of the U.S.O.E., several hundred research proposals came across my desk, approximately twenty per cent of which were approved. Every proposal which comes to the Bureau of Research is read carefully by several members of the Office staff. In addition proposals are read by research scholars representing every major area of research interest.

Talk given at Annual Meeting of National Reading Conference, December 2, 1966, St. Petersburg, Florida. by

Doris V. Gunderson

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Proposals which are not approved are so rated generally because of basic flaws, usually in design, which make them unacceptable as good research. Some proposals are approved with certain provisions. This means that flaws exist in the design, but in the opinion of the evaluators the flaws can be corrected. In these cases the research coordinator acquaints the investigator with the stipulated provisions and works with him to improve the proposal so that a contract can be negotiated.

One of my former colleagues, Dr. Gerald Smith, now at Syracuse University, analyzed 1,091 unsuccessful research proposals, 416 of which were eventually eliminated because they did not follow the Cooperative Research format or had been submitted previously.

His original study is available in unpublished form at Columbia University and is titled Inadequacies in a Selected Sample of Educational Research Proposals.

One of the most common inadequacies in research design is the way the problem is stated. The problem section of a research proposal should outline and delimit the problem clearly. An example of a non-delimited problem is a proposal which sought to locate new sources of individuals who could be recruited into education as teachers. The problem section consisted of a series of questions:

1. How many liberal arts graduates can be recruited into teaching and how many of these are in rural or in urban areas?
2. Is it possible to reorganize our schools and use our teachers more effectively?
3. Can the problem be solved by using teacher aides?
4. How many people have valid teaching certificates and are not using them? Could they be induced to return to teaching?

If so, what refresher courses are needed?

All of these questions appeared in the problem section of one proposal and serve as a prime example of failure to delimit a problem. Several research projects would be needed to answer all the questions presented.

Smith found, in examining proposals submitted to the Cooperative Research Program during a three year period, that the most frequent inadequacy, which occurred 87 per cent of the time in the problem section, was the lack of a theoretical frame work from which to approach the problem. Smith states that a full developed theory has (1) an explicit set of basic postulates or assumptions, and (2) an equally explicit set of logically derived hypotheses.

The problem of lack of significance also occured frequently-66 per cent of the time; usually an attempt was made to oversimplify complex problems or present them in such a way that it did not appear that the investigator was building upon previous research in the area. An example is this statement of a problem: " . . identification of factors accounting for bimodalities in data on student achievement at an institution.

Once an individual selects a problem for research, he must familiarize himself with the previous research conducted in the area. Frequently, a research project builds upon results of past research, or it may replicate a completed project to determine whether the same results will be obtained, and if not, to find the reasons for the differences. Certainly no researcher would be so naive that he would fail to examine the body of research to see what previous work had been done in the area. Such examination should represent a

critical analysis of the research design as well as the results of the research, and should demonstrate a relationship between past research and the proposal. This relationship should be demonstrated by indicating the basic weakness, if any, of previous approaches, by indicating that the present study follows leads uncovered by past efforts, and by demonstrating that the proposed study is significantly different from past efforts. A listing or summary of research with no description of its contributions to the field is of little value.

Provincialism in a review of research may be another inadequacy. Smith's analysis revealed four types: provincialism of scope, of geography, of substance, and of method. A proposal based on a single research study certainly is narrow in scope and places unnecessary restraints on the investigator, for the rest of the related literature should provide something of value such as suggestions concerning sampling, instrumentation, theoretical framework or other aspects of the total research process. If all studies cited were conducted at a single institution, one wonders if the investigator didn't want to bother to check another library. If all studies reviewed were carried on in a single state, one wonders if projects conducted in other states might not have provided useful information. If the related research is concentrated on only a limited number of substantive aspects of a problem, the investigator does not have an adequate base for his research. Provincialism of method is obvious if the studies reviewed are conducted with the same instrument. Provincialism indicates that only a part of the total past research effort was considered and that more information which was relevant to the current problem

and means of attacking it could have been used by the researcher.

A more serious inadequacy in the research proposal is the failure to include a review of related research. Some proposals contain nothing but reviews of related literature. One assumes that an investigator examines the body of research before he outlines his proposal. The inclusion of non-research references provides no information concerning the researcher's knowledge of the previous research. Although the non-research references may provide valuable information, the foundation for new research should be previous research.

In citing research some investigators generalize without supporting evidence, or simply state that research has been conducted in the area, or amplify results of investigations without specifically citing them. Such proposals are usually not approved for support. The proposal must contain a firm and specifically stated base in previous research. The proposal should also contain pertinent references to related literature.

Smith found that three per cent of the proposals he examined included no objectives, hypotheses, or questions. An additional 63 per cent were inadequate in the clarity with which the objectives, hypotheses, or questions were presented. The objectives and hypotheses may be stated too broadly for research purposes; for example:

> The broad hypothesis is that a procedure can be followed which will lead to the initial formulation, revision, and final development of a broadly conceived theory of education based upon psychological and other relevant research findings to date.

Probably the writer had something in mind when he made that statement, but it is difficult for the reader to determine just what.

[illegible] that many of the proposals he examined were seriously inadequate in this respect. Perhaps the writer has worked so intimately with his proposal that he assumes that his reader knows as much about the problem as he does.

In a well written proposal not only are the objectives, hypotheses, and questions clearly stated, but the technical concepts to be employed also are defined with clarity.

If the relationship between the theoretical framework and the objectives, hypotheses, or questions is to be adequate, the framework and theory must be developed in the statement of the problem.

When one thinks of flaws in design, the first thing that comes to mind is the procedure since it is so intimately a part of the design. In determining the population to be used in a study, the research must employ appropriate sampling techniques. Common inadequacies in sampling include incompleteness, a lack of clarity in the sampling plan, and lack of a well defined population.

Occasionally a researcher will use a sample which is based not upon the purposes of the study but rather upon the proximity of a particular group of subjects. Perhaps he may use an intact group, a group which existed before the study began. He must demonstrate clearly that such a group is adequate for the study he proposes.

Convenience and economy are legitimate criteria to use in selecting a sample. However, if they are the only criteria, the sample must be considered inadequate. The term "representative sample" is a familiar one; however, researchers often do not indicate the population of which the sample is representative. A sample should be representative of a particular finite population, and this population should be described in the proposal.

Another inadequacy in proposals concerns instrumentation. Occasionally the techniques and/or instruments are not described clearly and completely; if the investigator simply states that he will use a reading and achievement test but fails to state which test, the reader cannot determine whether the instrumentation is adequate to gather the necessary data. If the instrument will provide reasonably reliable data to answer the questions raised in the hypotheses, it is an appropriate instrument to use. The types of instruments vary with the purpose of the study; a questionnaire or a check list might be appropriate in one proposal and totally inappropriate in another.

Smith found that 17 per cent of the proposals he examined did not present a complete description of the statistical treatment of the data. Unless a complete description of the statistical method is given, the reader cannot discover what the investigator plans to do.

Another area of inadequacy is found in the language used for communication. Reading published research is often difficult for the layman if a great deal of statistical terminology is used. However, research proposals are

written to be read critically by people familiar with the vocabulary of research design and statistics. Sometimes the writer may employ too much unscientific language; sometimes he organizes his proposal poorly, and less often he may produce a proposal which lacks conciseness and sufficient detail and is difficult to read because the author overuses technical or pseudo-technical language.

A relatively new term now in popular use is "Hawthorne Effect". It refers to any fault in research by which one group of subjects either receives or believes they are receiving special consideration during the course of the study which would not have been given to a control group. The chance of a Hawthorne effect must be controlled or the results of a study may be invalidated.

Smith drew a number of conclusions from his examination of the research proposals. However, as a good researcher does, he warned that they are true for educational research only as the entire field of educational research is reflected in his sample.

1. The state of educational research is at a relatively low level of sophistication.
2. There is little agreement about what constitutes research in education.
3. Much of educational research is focused on relatively simple, straight forward, "surface" problems.

4. There is little emphasis upon theory in educational research.
5. Researchers have difficulty in differentiating between research and practice in education.
6. Educational researchers are making only minimal use of the previous research which has been done on similar problems.
7. There is little agreement about what a review of related research is supposed to accomplish.
8. Researchers are paying too little attention to the problms of good communication.
9. Hastily conceived ideas are translated into proposals without a sufficient period of germination.
10. The lack of detail is perhaps the one single most frequently occurring inadequacy in educational research proposals.

Smith's list of inadequacies or flaws in design of educational research may sound too much like an indictment of all efforts, but they should not be thought of in those terms. They represent a consensus of reasons why more than 1,000 research proposals were judged not worthy of Federal support.

Many of these proposals started out with worthwhile questions or ideas. It is tragic that good ideas are not translated into good research proposals. The purpose of educational research is to discover truth. A research effort that is successful yields a firm base for quality education. Quality education is worth the effort required to design a good research proposal.